

## Oribatids from Brunei I (Acari: Oribatida).

New and interesting mites from the Geneva Museum LXXV

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**Oribatids from Brunei I (Acari: Oribatida).** New and interesting mites from the Geneva Museum LXXV. - Eleven species from Brunei are discussed; nine of them are new to science, one of them representing a new genus: *Teraja* gen. n. (Microzetidae). Extended description of *Temburongia* Mahunka, 1990 is given. The following new combinations are proposed: *Sellnickochthonius planus* (Chinone) comb.n = *Brachychthonius planus* Chinone, 1974; *Teraja fimbriata* (Mahunka) comb.n. = *Microzetes fimbriatus* Mahunka, 1989.

**Key-words:** Acari - Oribatida - Taxonomy - New species, new genera - Brunei.

## INTRODUCTION

Oribatids are a major group of soil microarthropods with a high degree of diversity. Over 6000 described species in more than 1000 genera have been described (BALOGH & BALOGH 1992). They occur in many habitats, occupying a variety of niches, and their widespread distribution affords great scope for biogeographical studies (e.g. BERNINI, AVANZATI & BERNINI 1988; SUBIAS, ARILLO & GIL-MARTIN 1992; MAHUNKA 1993a).

Oribatida is an ancient group (150 - 200 million years) and the global distribution patterns of the species need to be interpreted within the context of continental drift. The oribatid fauna of South-East Asia is partly of Gondwanan and partly of Laurasian origin which makes zoogeographical interpretations somewhat problematic (HAMMER & WALLWORK 1979). A more thorough knowledge of the fauna of Borneo is critical for a clearer understanding of these matters.

Few data have been available for the North Bornean territories Sabah and Brunei (e.g. AOKI 1967; RAMSAY & SHEALS 1969), and none at all for Sarawak, until, in 1982. Dr. Bernd Hauser, Head of the Arthropod Department of the Museum d'Histoire naturelle, Geneva, began a systematic exploration of the soil fauna,

especially Microarthropoda, of the rain forests of South-East Asia and surrounding areas. Subsequently, 121 species records for Sabahn oribatids were published from his material, 94 of which were new to science (MAHUNKA 1987a, b, 1988, 1991, 1994b). Other published results on oribatids from this research program have been those from Singapore (MAHUNKA 1989a), Sumatra (MAHUNKA 1989b) and Madagascar (MAHUNKA 1993b, 1994a).

In the present paper<sup>1</sup>, oribatids collected from Brunei in 1988 by Dr. B. Hauser during his 1988 expedition to Brunei, organized together with Dr. Charles Lienhard, Research Officer at the same Department, are catalogued. Eleven species are listed, nine of them new to science.

I would like to thank Dr. M. Luxton for critically reading of the manuscript and for his valuable recommendations.

#### LIST OF LOCALITIES

Bru-88/12: Brunei (Brunei-Muara District): près du pont sur le ruisseau "Sungai Lubang Baru" sur la route venant de Tutong, à 33 km de Bandar Seri Begawan, prélèvement de sol dans les angles formés sur les contreforts de deux grands arbres proches des habitations, env. 20 m; 16.XI.1988; leg. B. H. (B)<sup>2</sup>

Bru-88/21: Brunei (Belait District): "Andulau Forest Reserve", à 3,5 km au sud de Sungai Liang (= à 39,5 km de Labi), forêt primaire ("Mixed dipterocarp forest"), K-7 ("Kompartment 7"), prélèvement de sol dans les angles formés par les contreforts de grands arbres, 50 m; 19.XI.1988; leg. B. H. (B)<sup>2</sup>

Bru-88/24: Brunei (Brunei-Muara District): "Berakas Forest Reserve" au nord de Bandar Seri Begawan sur la route, à 19,5 km de Muara (= à 102,5 km de Kuala Belait), forêt "Kerangas" (= "Tropical heath forest"), prélèvement de sol au pied de *Casuarina nobilis* Whitmore (*Casuarinaceae*), 30 m; 20.XI.1988; leg. B. H. (B)<sup>2</sup>

Bru-88/29: Brunei (Belait District): Sungai Liang, "Arboretum Forest Reserve", forêt primaire ("Mixed dipterocarp forest"), prélèvement de sol dans les angles formés par les contreforts de deux arbres appelés "Nyatho", 90 m; 21.XI.1988; leg. B. H. (B)<sup>2</sup>

Bru-88/32: Brunei (Belait District): "Labi Hills Forest Reserve", "Teraja", à 42 km au sud de Sungai Liang (= 12 km au Sud de Labi), environs de "Rumah Panjang" (= Longhouse du Kampung Teraja), forêt primaire ("Mixed dipterocarp forest"), prélèvement de sol dans les angles formés par les contreforts d'un très grand arbre, 40 m; 22.XI.1988; leg. B. H. (B)<sup>2</sup>

Bru-88/34: Brunei (Belait District): "Badas Forest Reserve", à env. 10 km sur la route secondaire qui bifurque, à 32 km de Kuala Belait, vers le sud, forêt "Kerangas" (= "Tropical heath forest") formée presque exclusivement par *Agathis dammara* (Lambert) L.G. Rich. (*Araucariaceae*), sur et sous écorces, 10 m; 23.XI.1988; leg. B. H.

Bru-88/35: Brunei (Belait District): "Badas Forest Reserve", à env. 10 km sur la route secondaire qui bifurque, à 32 km de Kuala Belait, vers le sud, forêt "Kerangas" (= "Tropical heath forest") formée presque exclusivement par *Agathis dammara* (Lambert) L.G. Rich. (*Araucariaceae*), prélèvement de sol au pied de *Agathis dammara*, 10 m; 23.XI.1988; leg. B. H. (B)<sup>3</sup>

Bru-88/38: Brunei (Temburong District): "Peradayan Forest Reserve" (= "Bukit Patoi"), à 14,5 km de Bangar (= 2,5 km de Labu) forêt primaire ("Mixed dipterocarp forest"), prélèvement de sol dans les angles formés par les contreforts de grands arbres morts, 80 m; 24.XI.1988; leg. B. H. (B)<sup>3</sup>

<sup>1</sup> Partly sponsored by the Hungarian National Scientific Research Fund (OTKA 17629).

<sup>2</sup> (B) = extraction par appareil Berlese à Bandar Seri Begawan (Brunei).

<sup>3</sup> (B) = extraction par appareil Berlese à Hong Kong.

## LIST OF IDENTIFIED SPECIES

**Brachychthoniidae** Thor, 1934*Sellnickochthonius muara* sp. n.

Localities: Bru-88/12; Bru-88/24.

*Sellnickochthonius planus* (Chinone, 1974) comb. n.

Locality: Bru-88/24; 2 specimens.

**Phthiracaridae** Perty, 1841*Hoplophthiracarus (Plonaphacarus) aculeatus* sp. n.

Locality: Bru-88/38.

*Notophthiracarus hauseri* sp. n.

Locality: Bru-88/21.

**Temburongiidae** Mahunka, 1990*Temburongia patoi* Mahunka, 1990

Localities: Bru-88/21; Bru-88/38.

**Sabahtritiidae** Mahunka, 1988*Sabahtritia lienhardi* sp. n.

Locality: Bru-88/29.

**Eremaeozetidae** Balogh, 1972*Eremaeozetes maculosus* sp. n.

Locality: Bru-88/24.

**Microzetidae** Grandjean, 1936*Teraja wongi* gen. n., sp. n.

Locality: Bru-88/32

**Carabodidae** C. L. Koch, 1837*Hardybodes flabellatus* sp. n.

Locality: Bru-88/21; Bru-88/32; Bru-88/38.

*Hardybodes penicillatus* sp. n.

Locality: Bru-88/35.

*Pasocephus ermaeozetoides* sp. n.

Locality: Bru-88/32

## DESCRIPTIONS AND IDENTIFICATIONS

**Sellnickochthonius muara** sp. n.

(Figs 1-4)

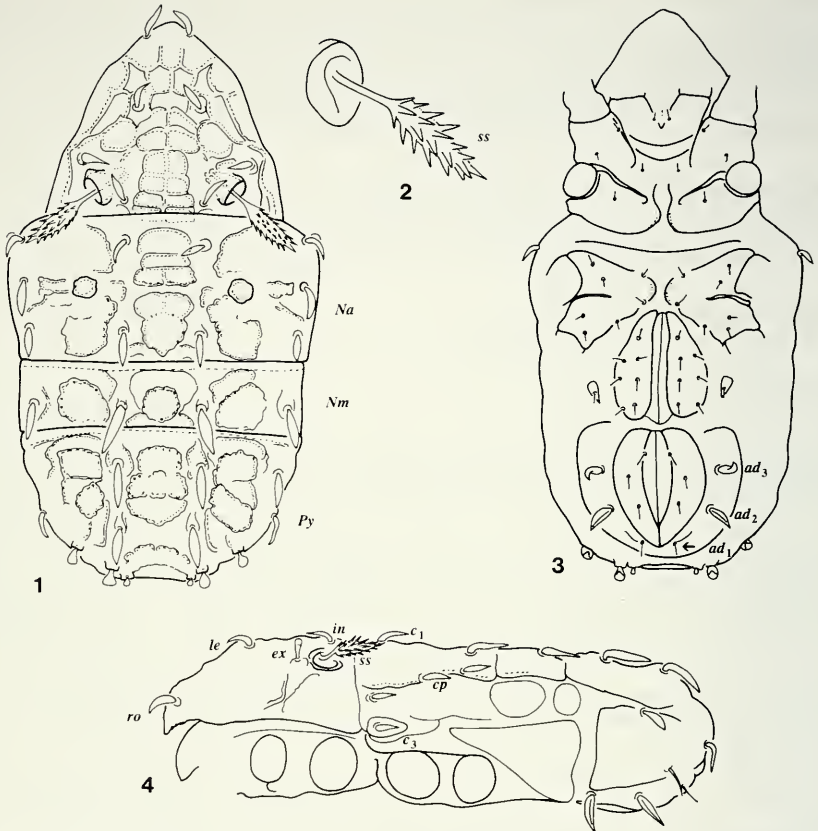
**Material examined:** Holotype: Bru-88/24, 2 paratypes from the same sample; 3 paratypes: Bru-88/12. Holotype and 3 paratypes: MHNG<sup>4</sup>, 2 paratypes (1364-PO-89): HNHM<sup>5</sup>.

**Measurements.** - Length: 140-148 µm; width: 70-75 µm.

**Prodorsum:** Rostrum conical, rostral teeth not visible in dorsal view. Prodorsal surface well sclerotized, ornamented by conspicuously outlined areolar patches, typical for the genus, as shown in Fig. 1. Prodorsal setae phylliform, essentially subequal. Interlamellar setae arising far from each other, near to the bothridium. Head of sensillus (Fig. 2) symmetrical, covered with large spines arranged in longitudinal rows.

<sup>4</sup>MHNG = deposited in the Muséum d'histoire naturelle, Genève.

<sup>5</sup>HNHM = deposited in the Hungarian Natural History Museum, Budapest, with identification number of the specimens in the Collection of Arachnida.



FIGS 1-4

*Sellnickochthonius muara* sp. n. - 1: body in dorsal view, 2: sensillus, 3: body in ventral view, 4: body in lateral view.

**Notogaster:** Border of notogastral shield *Na* partly reduced or absent (Fig. 1). In the midline of shield *Na* the first, second and fifth pair of patches completely fused; borders of some fields sinuous. Border of ring-spot strong, also sinuous.

**Ventral region:** Form and position of ventral setae as shown in Fig. 3.

**Remarks:** The new species belongs to the "zelawaiensis" - group [containing e. g. also *S. zelawaiensis* (Sellnick, 1928), *S. foliatus* (Hammer, 1958), *S. elsosneadensis* (Hammer, 1958), *S. hauserorum* (Mahunka, 1979), *S. elisabethae* Mahunka, 1973 and *S. griseus* (Hammer, 1958). The group is characterized by the foliate notogastral setae, the symmetrical sensillus and the medially partly fused patches on the notogastral shield *Na*.

The species is named after the city Muara.

**Sellnickochthonius planus** (Chinone, 1974) comb.n.

(Figs 5-8)

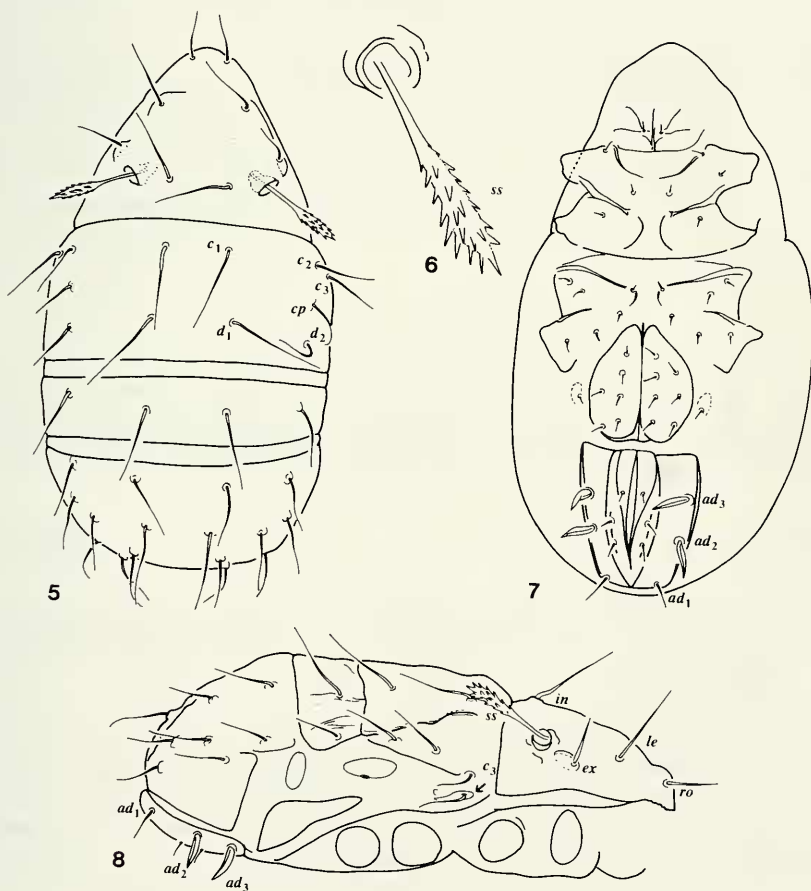
= *Brachychthonius planus* Chinone, 1974.

Material examined: Bru-88/24: 2 specimens.

The species was described by CHINONE from Japan. The newly collected specimens entirely correspond to the description and figures given by CHINONE (1974). This species is particularly characterized by the basally curved prodorsal and dorsal setae (Figs 5-8).

On the basis of the form of adanal setae this species belongs to the genus *Sellnickochthonius* Krivolutzky, 1964.

Measurements. - Length: 155-157  $\mu\text{m}$ ; width: 85-89  $\mu\text{m}$ .



FIGS 5-8

*Sellnickochthonius planus* (Chinone, 1974) - 5: body in dorsal view, 6: sensillus, 7: body in ventral view, 8: body in lateral view.

**Hoplophthiracarus (Plonaphacarus) aculeatus** sp. n.

(Figs 9-15)

**M a t e r i a l e x a m i n e d :** Holotype: Bru-88/38; 4 paratypes from the same sample. Holotype and 2 paratypes: MHNG, 2 paratypes (1365-PO-89): HNHM.

**M e a s u r e m e n t s :** - Length of aspis: 290-335  $\mu$ m; length of notogaster: 526-729  $\mu$ m; height of notogaster: 364-567  $\mu$ m.

**A s p i s :** Dorsal outline gradually convex, but rostrum clearly incised in lateral view. Median crista absent, lateral carina short, not reaching beyond the sinus line and not directed to the lateral rim (Fig. 12). Dorsal surface ornamented by weak alveoli, but near to the posterior margin some stronger ones exist (Fig. 11). All prodorsal setae - excepting seta *ex*-thick and finely ciliate.

**N o t o g a s t e r** (Fig. 9): Surface always covered by cerotegument with debris. Cuticle ornamented by alveoli. Forty (!) pairs of mostly straight and erect notogastral setae present. Setae  $c_1$  slightly longer than the others, but no essential difference existing between them. The lyrifissures and the alveoli of the vestigial setae (*f*) hardly observable, but two lyrifissures (*ia*, *im*) and the alveoli of setae  $f_1$  visible.

**A n o g e n i t a l r e g i o n :** The position of the genital setae (Fig. 10) is typical for the subgenus *Plonaphacarus*. All four pairs of setae on the ano-adanal plates roughened or finely ciliate. Setae  $ad_3$  somewhat shorter than the anal ones.

**L e g s :** Seta *d* on femur I hooked (Fig. 13). Seta *l* missing on tarsus I (Fig. 14). The setal fomulae are:

I: 1-4-2+2-5+1-16+3-1

IV: 2-1-1-2+1-10-1 (Fig. 15).

**R e m a r k s :** The large number of notogastral setae is unique in this family. Considering the other features, the new species is correctly placed in the genus *Hoplophthiracarus* Jacot, 1933, and therein in the subgenus *Plonaphacarus* Niedbala, 1986.

The species is named after the form of the notogastral setae.

**Notophthiracarus hauseri** sp. n.

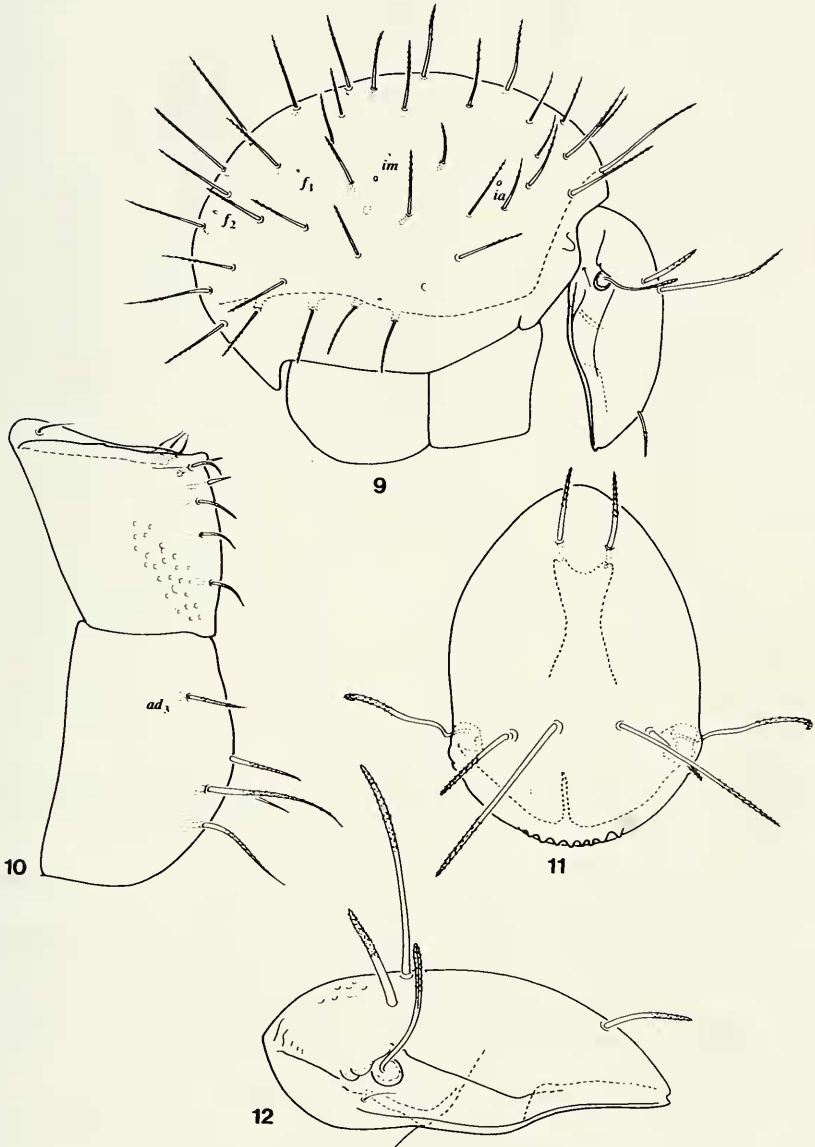
(Figs 16-24)

**M a t e r i a l e x a m i n e d :** Holotype: Bru-88/21; 5 paratypes from the same sample. Holotype and 3 paratypes: MHNG, 2 paratypes (1366-PO-89): HNHM.

**M e a s u r e m e n t s .** - Length of aspis: 162-221  $\mu$ m; length of notogaster: 315-433  $\mu$ m; height of notogaster: 207-261  $\mu$ m.

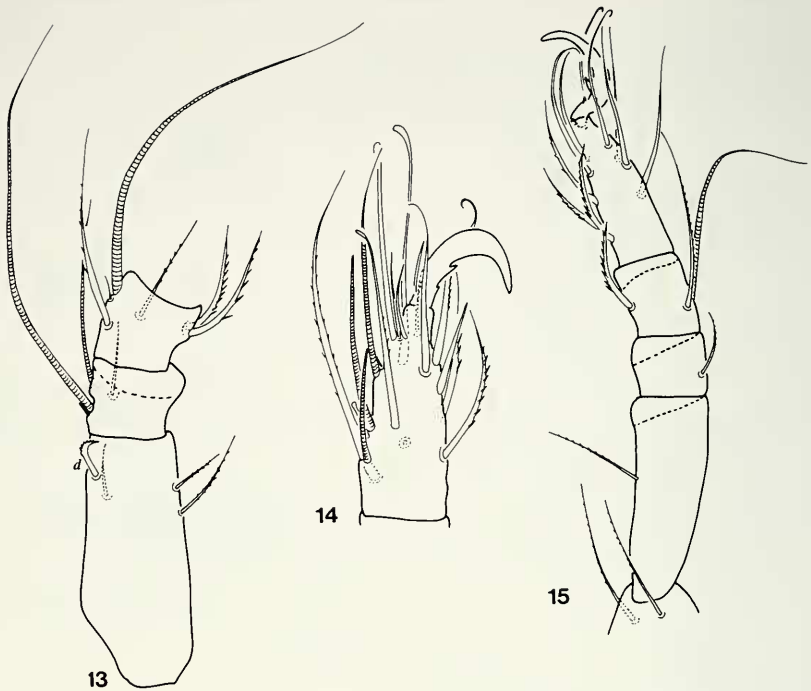
**A s p i s :** Its outline angulate in lateral view (Fig. 16), median crista strong, distinctly protruding from the surface; a weaker lateral crista also present. Anterior surface areolate, aspis basally ornamented by longitudinal rugae amongst which are oblong spots (Fig. 19). Lateral carina absent, lateral rim very short, sinus-line distinct. All prodorsal setae (excepting setae *ex*) phylliform. Sensillus long, thin, approximately setiform, distinctly spinose; spines arranged in two longitudinal rows.

**N o t o g a s t e r :** Anterior part of notogaster very wide, protruding forward, in dorsal view covering the basal part of aspis (Fig. 18). Surface of notogaster with large protuberances and three longitudinal ribs gradually disappearing anteriorly (Fig. 18). Fifteen pairs of phylliform notogastral setae present, their distal end sharply pointed.



FIGS 9-12

*Hoplophthiracarus (Plonaphacarus) aculeatus* sp. n. - 9: body in lateral viw, 10: anogenital region, 11: aspis in dorsal view, 12: aspis in lateral view.



FIGS 13-15

*Hoplophthiracarus (Plonaphacarus) aculeatus* sp. n. - 13: basal articles of leg I, 14: tarsus of leg I, 15: leg IV.

**G n a t h o s o m a :** Chelicera and palp as shown in Figs 17, 24. Palp three-segmented, its setal formula: 2-2-8+1.

**A n o g e n i t a l r e g i o n** (Fig. 22): Genital plate hollowed laterally, its surface areolate. Posterior five pairs of genital setae much longer than the others, the anterior 2-3 pairs minute, hardly discernible (Fig. 23). Among the setae of the ano-adanal plates 4 pairs are reduced so much as to be represented only by their alveoli, only setae *ad*<sub>3</sub> visible.

**L e g s :** The legs chaetotaxy is of the "complete type" showing the subsequent setal formulae:

I: 1-4-2+2-5+1-16+3-1 (Fig. 21)

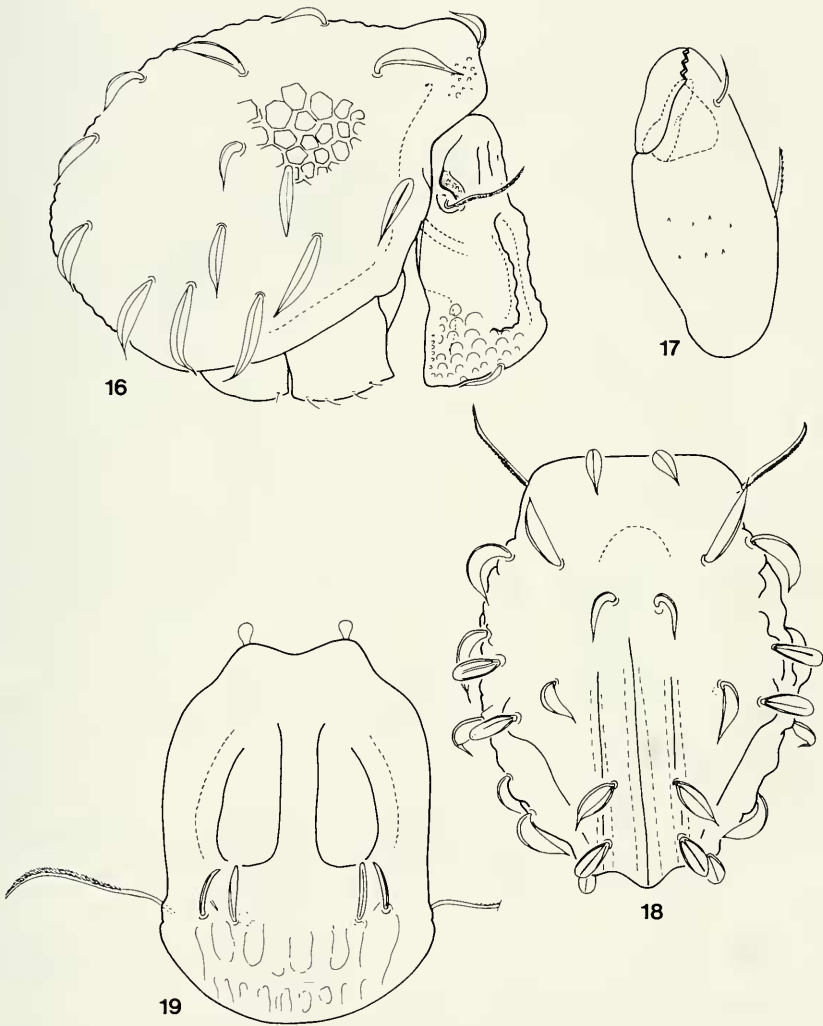
II: 1-3-2+1-3+1-12+2-1

III: 2-2-1+1-2+1-10-1

IV: 2-1-1-2+1-10-1 (Fig. 20)

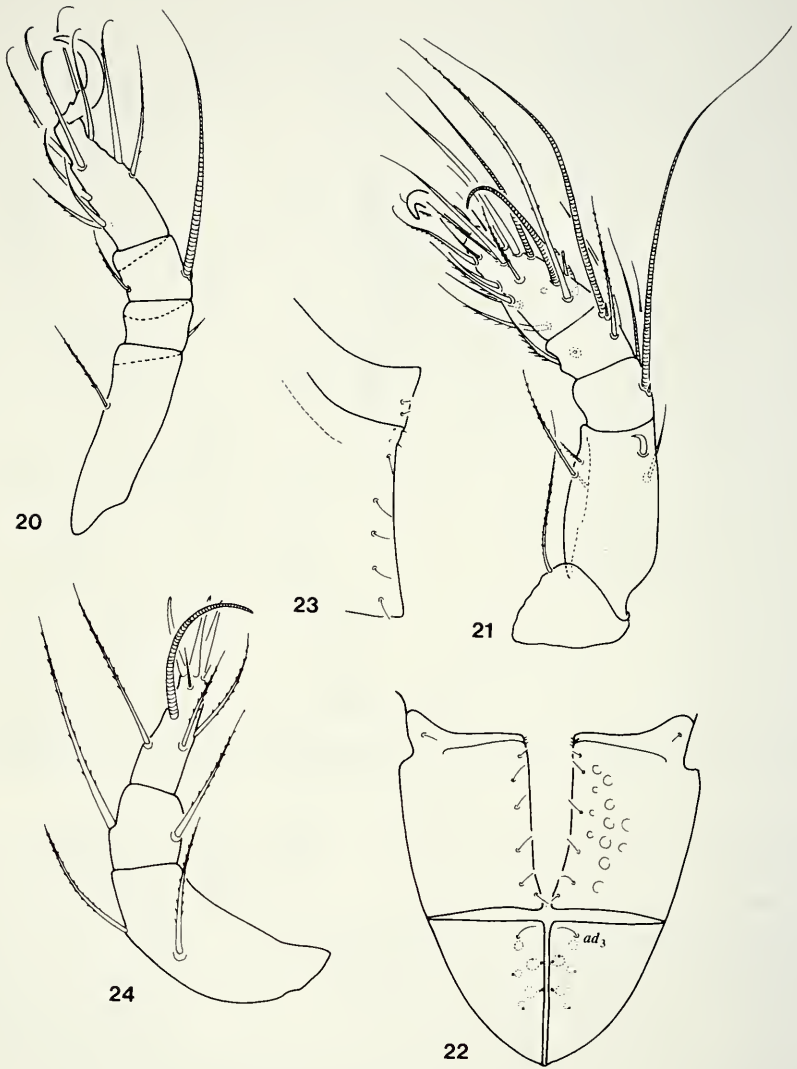
**R e m a r k s :** The new species corresponds well with the genus *Notophthiracarus* Ramsay, 1968, and belongs to a species group characterized by the phylliform notogastral setae [(e.g. *N. multituberculatus* (Balogh & Mahunka, 1966)].





FIGS 16-19

*Notophtiracarus hauseri* sp. n. - 16: body in lateral view, 17: chelicera, 18: notogaster in dorsal view, 19: aspis in dorsal view.



FIGS 20-24

*Notophthiracarus hauseri* sp. n. - 20: leg IV, 21: leg I, 22: anogenital region, 23: genital plate, 24: palp.

I dedicate the new species to my friend Dr. Bernd Hauser, the collector of this very important and interesting material.

### **Temburongia Mahunka, 1990**

**D i a g n o s i s**<sup>6</sup>: Aspis with two pairs of median (!) and one pair of lateral (divided) cristae. One lateral carina and a sinus-line on both sides long, well developed. All three pairs of median notogastral setae modified, setae *ro* originating far from the rostrum. Notogastral shield much extended ventrally and passing between the genito-aggenital and ano-adanal plates, dividing them on the surface. The two ventral lobes of the notogaster independent (not fused), but touching medially. Fourteen pairs of notogastral setae present, the vestigial setae ( $f_1$ ) are behind setae  $h_1$ , neither lyriffisures nor opening of glandules observable. Genital and aggenital plates, like anal and adanal plates, completely fused with each other. The genito-aggenital plates also fused basally with each other, only a short division between them anteriorly, the narrowed basal part arched and forming a deep sinus with the similar part of the ano-adanal plates inside the body, covered by the ventral lobes of the notogaster. Seven pairs of genital (aggenital) setae present. Ano-adanal plates forming a semicircle, six pairs of setae arising on them, all arranged in longitudinal rows along the inner margin of the plates. Chelicerae well developed, both the fixed and the movable digits are dentate. Palp four-segmented. Legs: monodactylous. Setae on femur I display characteristic reduction, otherwise, the legs belong to a characteristic chaetotaxy group.

**T y p e s p e c i e s**: *Temburongia patoi* Mahunka, 1990.

**R e m a r k s**: On the basis of the above features the new taxon is so far from all distinct groups of the superfamily *Euphthiracaroida*, that it could not be accommodated in any of the heretofore known families; therefore, a new family (*Temburongiidae* Mahunka, 1990) was established. It represents a so far unknown line of evolution within the "phtiracaroid" oribatids shedding some light on how the "ventral plate" of the higher oribatids could have developed.

The genus is named after the Temburong District.

### **Temburongia patoi Mahunka, 1990**

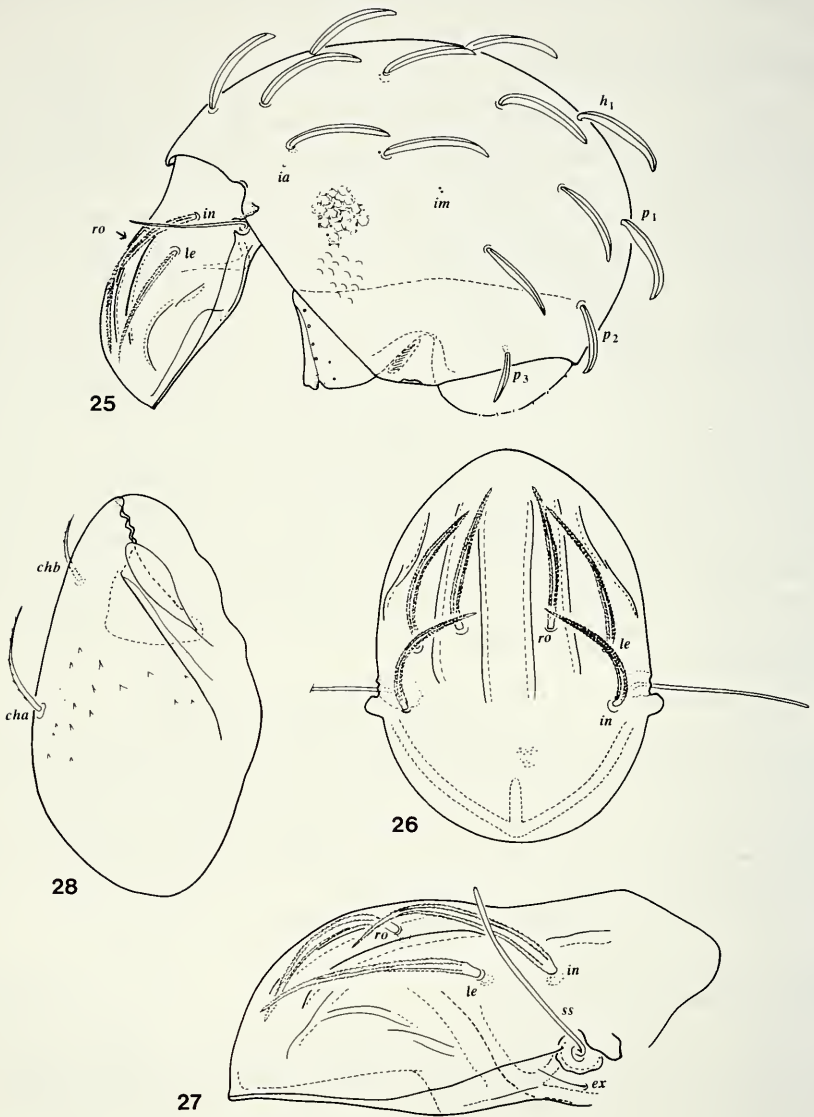
(Figs 25-36)

**M a t e r i a l e x a m i n e d**: Holotype: Bru-88/21, 19 paratypes from the same sample; 16 paratypes: Bru-88/38. Holotype and 22 paratypes: MHNG, 13 paratypes (1367-PO-89): HNHM.

**M e a s u r e m e n t s**. - Length of aspis: 182-276  $\mu\text{m}$ ; length of notogaster: 276-448  $\mu\text{m}$ ; height of notogaster: 197-335  $\mu\text{m}$ .

**A s p i s**: Its outline concave medially and strongly convex anteriorly. Whole surface finely granulate. Two pairs of median cristae long, the third, outer one is

<sup>6</sup> This description completes a preliminary one in MAHUNKA (1990).

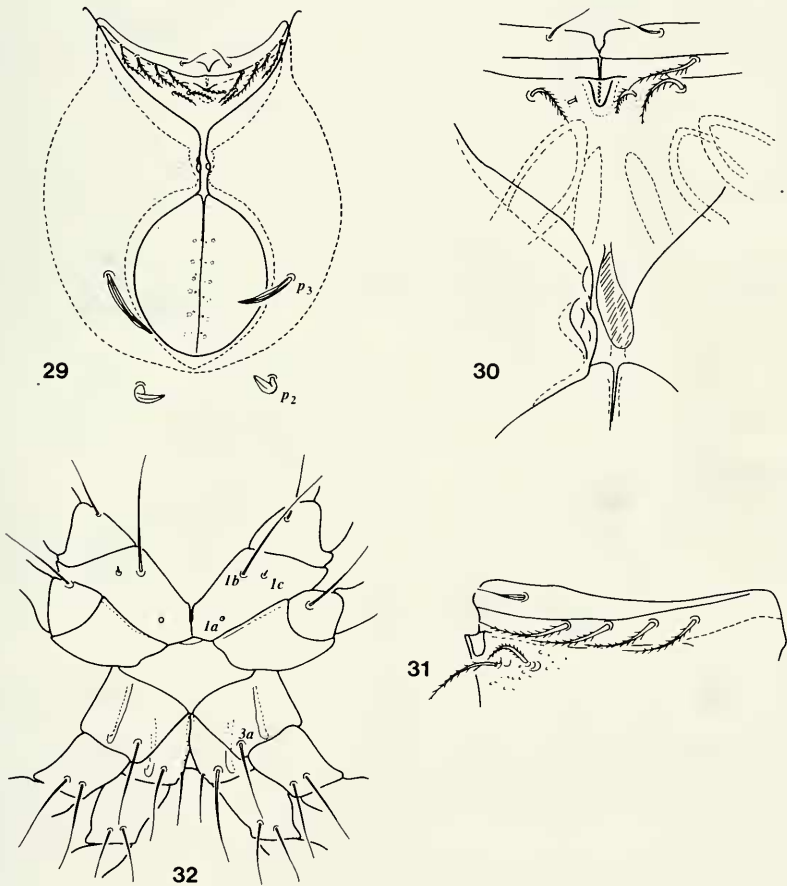


FIGS 25-28

*Temburongia patoi* Mahunka, 1990 - 25: body in lateral view, 26: aspis in dorsal view, 27: aspis in lateral view, 28: chelicera.

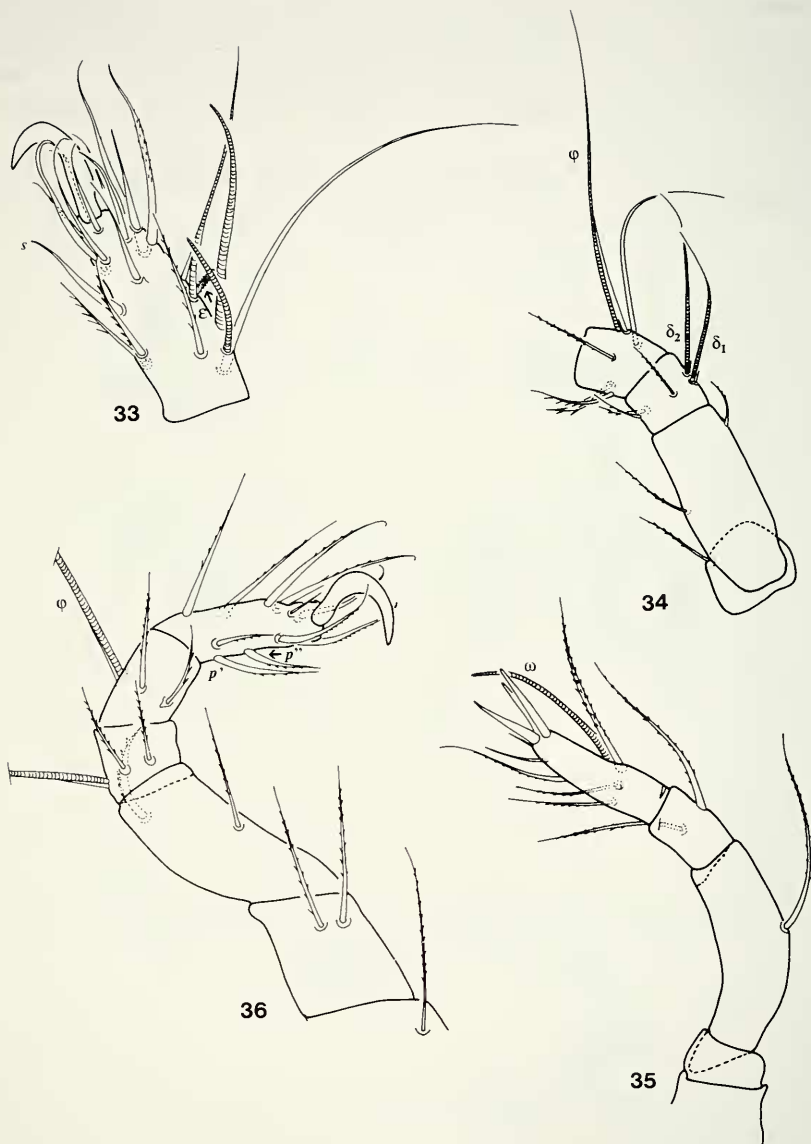
divided into two arched parts (Fig. 26). Lateral carina long, running along lateral margin anteriorly, instead of the lateral rim. This lateral rim very short, hardly observable; sinus-line very long and strong. Three pairs of strong, sabre-shaped, distinctly spiculate and one pair (*ex*) of thin, simple, prodorsal setae present. Sensillus long, stick-shaped, only slightly arched (Fig. 27). Bothridial squama large, approximately guttiform.

**N o t o g a s t e r :** Whole surface covered by a cerotegument layer mostly forming granules imitating alveoli. Collar line not observable. Fourteen pairs of



FIGS 29-32

*Temburongia patoi* Mahunka, 1990 - 29: anogenital region, 30: genital plates, 31: anterior margin of genital plate, 32: coxisternal region.



FIGS 33-36

*Temburongia patoi* Mahunka, 1990 - 33: tarsus of leg I, 34: basal articles of leg I, 35: palp, 36: leg III.

notogastral setae present, all highly similar, but setae  $p_1$ ,  $p_2$ , and especially  $p_3$ , shorter than the others. All setae phylliform, with median vein, their surface and margin smooth. Lyrifissures *ia* and *im* present, other lyrifissures absent (?). Ventral lobes of notogaster approximate medially, ending very near to each other (Fig. 29), their margin slightly emarginate medially.

**G n a t h o s o m a :** Chelicera as shown in Fig. 28. Palpal setal formula: 0-1-2-9+1.

**E p i m e r a l r e g i o n** (Fig. 32): Epimeral setal formula: 3-0-1-2, but one pair of setae on epimere 1 (perhaps *1a*) reduced, represented only by alveoli, and far removed posteriorly from the other two setae.

**A n o g e n i t a l r e g i o n :** Genital plates fused basally, but anteriorly separated from each other, in front of a sacculiform structure (Fig. 30). The narrowed posterior part of genito-aggenital plates arched and delving into deeper layers of the body and not directly connected with the similarly arched anterior part of ano-adanal plates (Fig. 29). Seven pairs of genital setae present, one of them smooth and arising on the anterior border of genital plates (Fig. 31); four pairs of these conspicuously ciliate and originating in a more or less transverse furrow, two pairs arising near to the sacculiform structure. Six pairs of identical ano-adanal setae observable, all six arranged in a longitudinal row; all short, thin and simple.

**L e g s :** Claw of legs thick but simple, without ventral teeth. Setation of legs characteristic, and different from all related taxa. Setal formulae:

- I: 1-2(!)-5+2-5+1-17+3-1  
 II: 1-3-4+1-5+1-12+2-1  
 III: 2-2-3+1-3+1-11-1  
 IV: 2-2-2-3+1-11-1

On tarsus I a single seta arises near the basis of  $\omega_2$  (Fig. 33). Setae  $p'$  and  $p''$  on tarsi III (Fig. 36) and IV are of different type.

**R e m a r k s :** The species is named after the hill of Bukit Patoi.

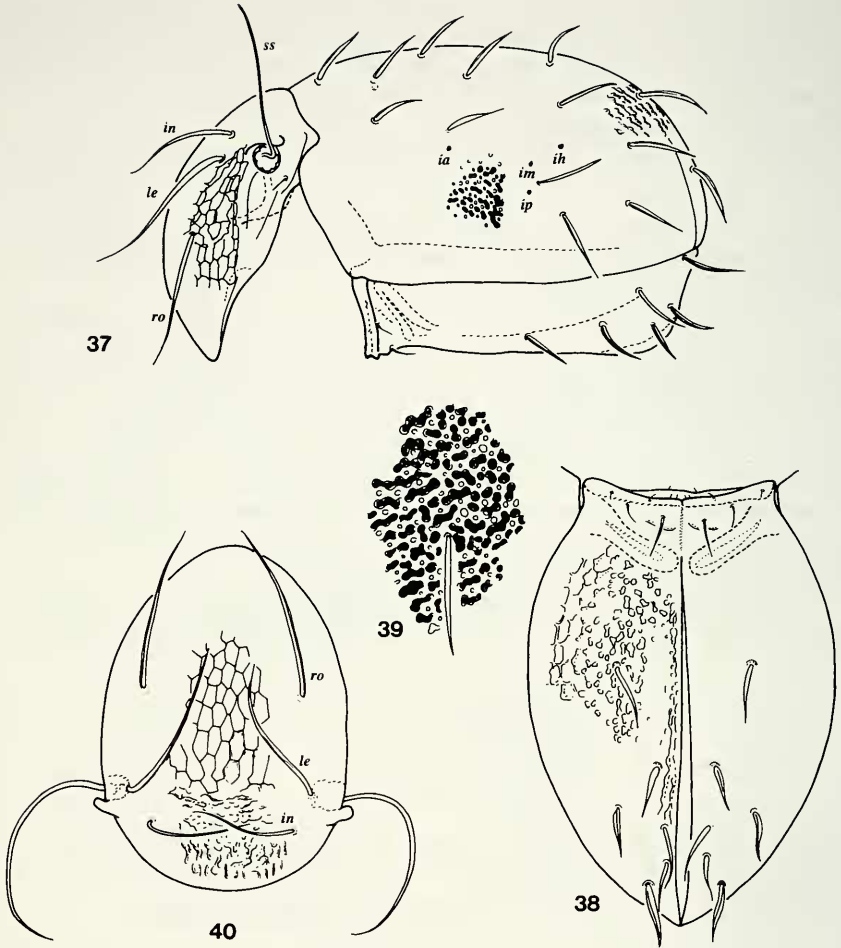
**Sabahtritia lienhardi** sp. n.

(Figs 37-43)

**M a t e r i a l e x a m i n e d :** Holotype: Bru-88/29, 23 paratypes from the same sample. Holotype and 15 paratypes: MHNG, 10 paratypes (1368-PO-89): HNHM.

**M e a s u r e m e n t s . -** Length of aspis: 133-169  $\mu\text{m}$ ; length of notogaster: 194-266  $\mu\text{m}$ ; height of notogaster: 97-163  $\mu\text{m}$ .

**A s p i s :** Its outline gradually convex in lateral view (Fig. 37). Surface ornamented by a conspicuous network dorsally and by irregular wrinkles basally; a narrow lateral part smooth. Lateral rim inconspicuous, a weak, short lateral carina and a sinus line on each side observable. Median prodorsal setae slightly dilated, with a thin velum. Sensillus setiform, long. Setae *in* the shortest of all prodorsal setae. Bothridium small, but protruding conspicuously from the outline in dorsal view (Fig. 40).



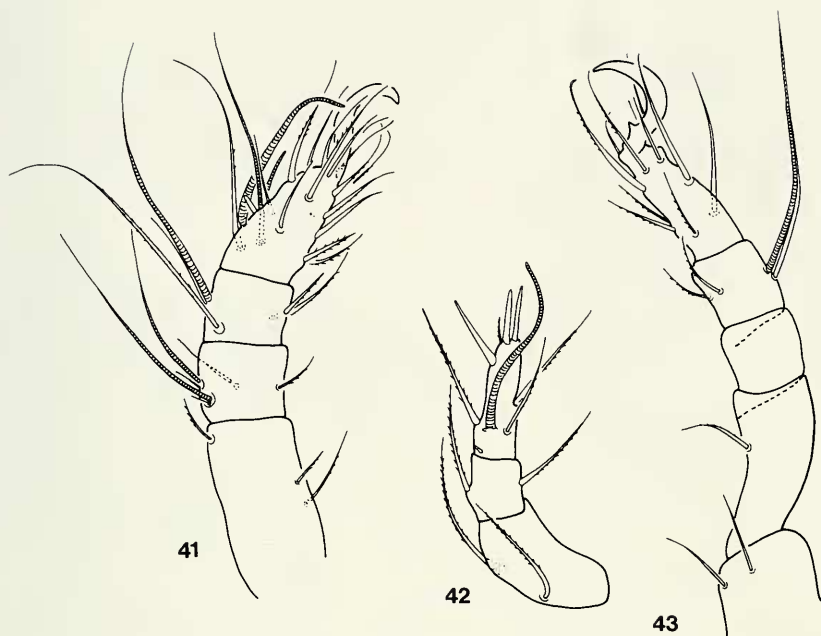
FIGS 37-40

*Sabahtritia lienhardi* sp. n. - 37: body in lateral view, 38: anogenital region, 39: sculpture of notogaster, 40: aspis in dorsal view.

**Notogaster:** Cuticle foveolate, cerotegument layer consisting of small tubercles arranged so as to form a rugose, almost reticulate, pattern (Fig. 39) around the foveolae. 14 pairs of phylliform notogastral setae present. Four pairs of lyri-fissures (*ia*, *im*, *ih*, *ip*) visible; no vestigial setae observable.

**Anogenital region** (Fig. 38): Anogenital plates typical for the genus, ornamented by a polygonal reticulation. Seven pairs of genito-aggenital, 3 pairs of adanal setae visible.





FIGS 41-43

*Sabahtritia lienhardi* sp. n. - 41: leg I, 42: palp, 43: leg IV.

**G n a t h o s o m a :** Chelicera normal, both digits equally strong. Palp (Fig. 42) three-segmented, setal formula: 2-2-7+1.

**L e g s :** Chaetotaxy of the "complete type", with following setal formulae:

I: 1-3-5+2-4+1-19+3-1 (Fig. 41)

II: 1-2-2+1-3+1-13+2-1

III: 2-1-0-(3+1)-12-1 (Fig. 43)

**R e m a r k s :** *S. lienhardi* is the third species of this genus. It is clearly distinguished from both known species by the shape of its notogastral setae (also phylliform but much broader in *S. hauseri*) or the shape of ano-adanal setae (serrated, very long in *S. mirabilis*).

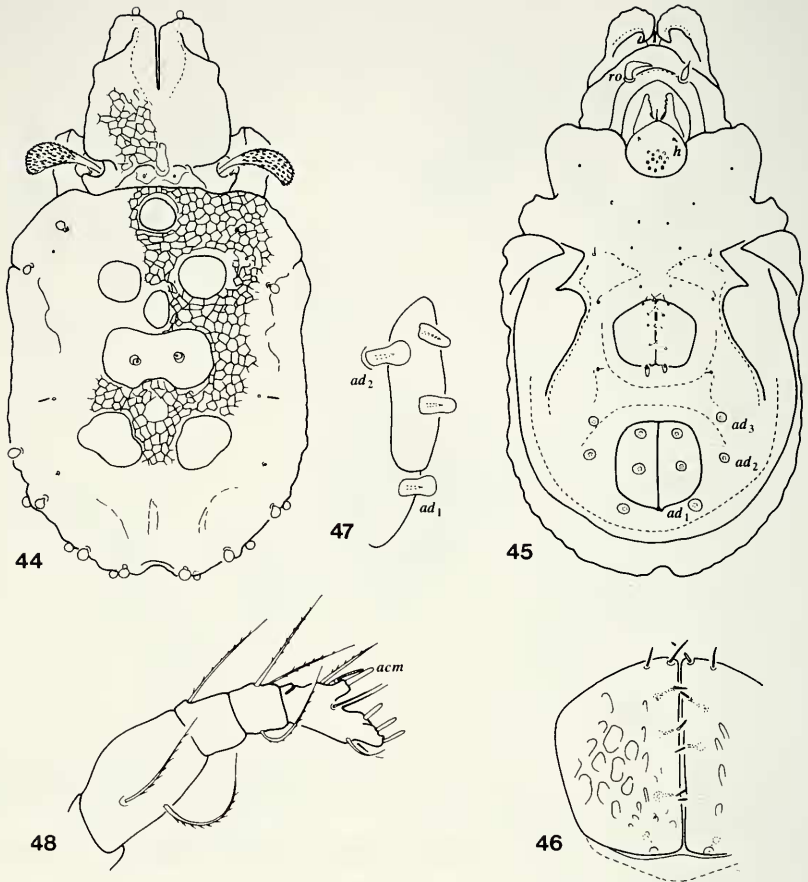
I dedicate the new species to Dr. Charles Lienhard for his continuous help in correcting my manuscripts and for his collaboration with Dr. B. Hauser's field activity.

**Eremaeozetes maculosus** sp. n.

(Figs 44-52)

**M a t e r i a l e x a m i n e d :** Holotype: Bru-88/24, deposited in the MHNG.

**M e a s u r e m e n t s . -** Length: 403  $\mu$ m; with: 216  $\mu$ m.

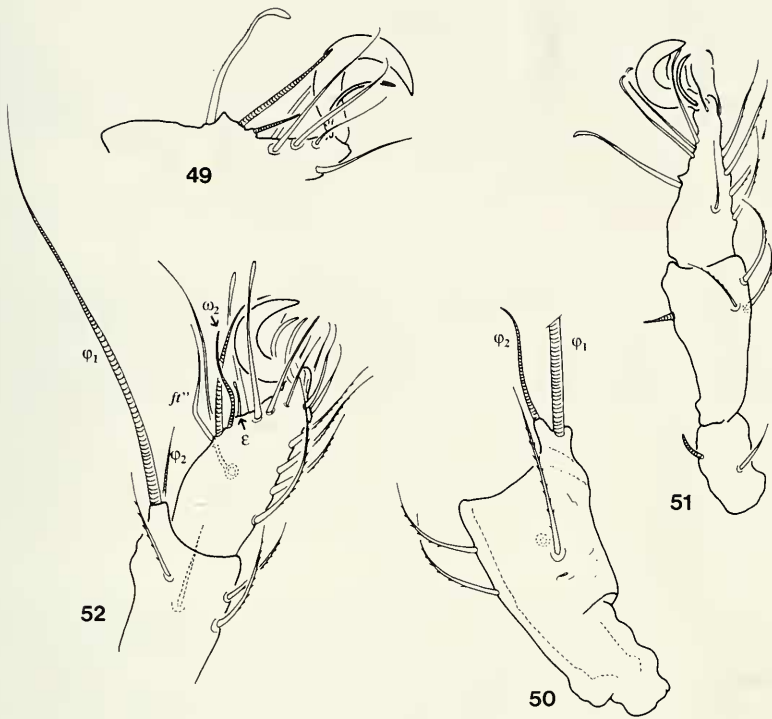


FIGS 44-48

*Eremaozetes maculosus* sp. n. - 44: body in dorsal view, 45: body in ventral view, 46: genital plate, 47: anal plate in lateral view, 48: palp.

**Prodorsum:** Surface (as the whole surface of the body) covered by reticulate cerotegument, which mostly reflects the sculpture of the cuticular surface. Lamellae wide, fused basally and covering the whole prodorsum, excepting the basal region (Fig. 44). Lamellar setae dilated, originating on the bent distal end of lamellae. Rostral setae (*ro*) horn-shaped<sup>7</sup>. Interlamellar and exobothridial setae well developed, like small spines. Sensillus very large, flabellate, with spiculate surface.

<sup>7</sup> Some setae (*ro*, *ge*, *an* and *ad*) of the body are robust. It seems to me, that they only consist of secretions or are covered by a thick secretion layer. When these "setae" were broken during preparation, no "real" setae could be found inside.



FIGS 49-52

*Eremaozetes maculosus* sp. n. - 49: tarsus of leg II, 50: tibia of leg II, 51: leg. III, 52: leg. I.

**Notogaster:** Humeral process well developed, bent downwards to the epimeral surface. Lenticulus round. Some irregular, partly fused smooth areas medially, over them the cerotegument layer lost (Fig. 44), all other surfaces areolate. Ten pairs of dilated, round notogastral setae, the lyrifissures *im* and the glandular openings visible in dorsal view.

**Ventral region:** Epimeral setal formula: 3-1-2-2. All setae short, spiniform, hardly observable because of the thick cerotegument. Genital (Fig. 46) and anal plates also areolate and covered by cerotegument. Anogenital setal formula: 6-1-2-3. The posterior pair of genital setae and all anal and adanal setae (*ad*), robust but their form varying (Fig. 47).

**Gnathosoma:** Mentum foveolate, seta *h* bending backwards, originating laterally. Palpal eupathidium *acm* arising on a large apophysis, palpal setal formula: 2-1-3-9+1 (Fig. 48).

**Legs:** All legs tridactylous, with strong heretodactyly. Tarsus of legs II-IV (Fig. 49) with a triangular dorsal spur, e.g. leg III (Fig. 51). Solenidium  $\phi_1$  originating on a long apophysis, the latter giving rise to a smaller anteriorly directed apophysis on

which  $\varphi_2$  is situated. Seta *ft*" on tarsus I (Fig. 52) strongly and characteristically curved, famulus ( $\epsilon$ ) long, arising in front of  $\omega_2$ .

**R e m a r k s :** The new species is clearly characterized by the special formation of the dorsal cerotegument and the form and position of the genital and anal setae. On the basis of these characters the new species is quite distinct from all other members of the genus.

### **Teraja gen. n.**

**D i a g n o s i s :** Family *Microzetidae*. Rostrum conical. Lamellae wide with long, horn-shaped, outer, and, completely reduced, inner cuspis; their median borders partly touching medially, excavated basally and at their basal ends connected by an arched transversal band. Lamellar setae spiniform, the phylliform interlamellar seta arising on the dorsal surface of the lamellae. Tutorium with a velum-like formation anteriorly. Sensillus setiform, directed backwards. Pteromorphae small, triangular. Epimeral setal formula 3-1-3-3. A strong x-shaped sejugal formaton present in front of the genital aperture. Ano-adanal setal formula: 6-1-2-2. Lyrifissures *iad* very long. All legs monodactylous.

**T y p e s p e c i e s :** *Teraja wongi* sp. n.

**R e m a r k s :** The new taxon is related to *Microzetes* Berlese, 1913 and *Megazetes* Balogh, 1959, but both are distinguished from the new genus by the lack of the characteristic velum-like formation of the tutorium. Only *Microzetes fimbriatus* Mahunka, 1989 shows the some velum-lke formation of the tutorium and consequently has to be transferred to the new genus: *Teraja fimbriata* (Mahunka, 1989) comb.n.

The new genus is named after the village of Teraja.

### **Teraja wongi** sp. n.

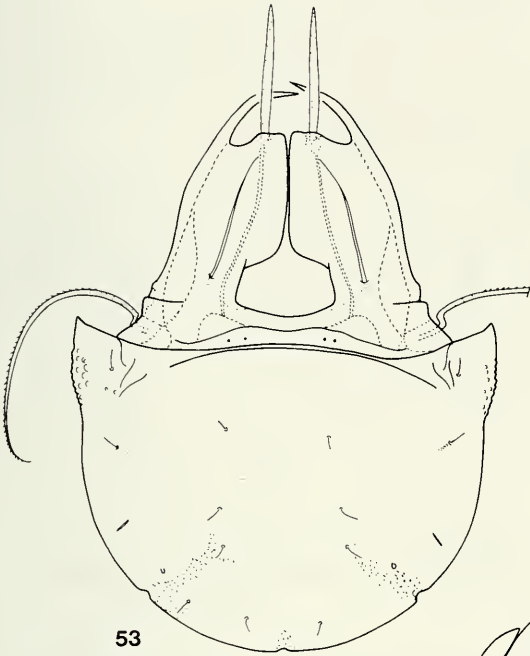
(Figs 53-56)

**M a t e r i a l e x a m i n e d :** Holotype: Bru-88/32; 6 paratypes from the sample. Holotype and 4 paratypes: MHNG, 2 paratypes (1370-PO-89): HNHM.

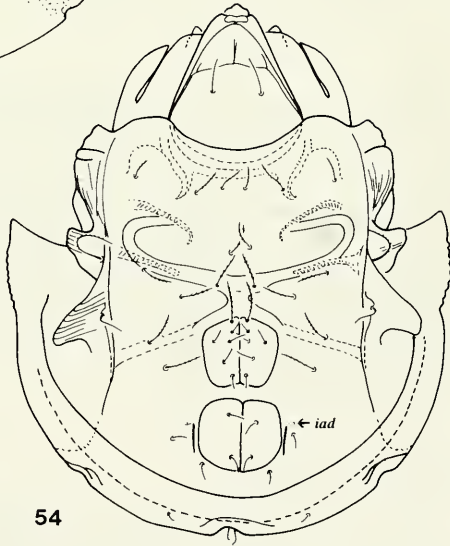
**M e a s u r e m e n t s . -** Length: 242-251  $\mu$ m; width: 197-202  $\mu$ m.

**P r o d o r s u m :** Rostrum conical in dorsal, beak-shaped in lateral view. Rostral setae long, distinctly pilose. Lamellae wide, covering prodorsum in dorsal view. Outer lamellar apex very long, strongly curved inwards and always reaching beyond lamellar seta (Fig. 55). Interlamellar setae fine and densely pilose. Sensillus long, setiform, its outer margin distinctly pilose, excepting basal part. Distal end of tutorium with some (3-4) digitiform extensions.

**N o t o g a s t e r :** Pteromorphae (Fig. 56) small, approximately triangular, anterior surface wrinkled, basally ornamented by some small tubercles. Posterior outline incised medially and laterally; these hollows continue in a flat furrow, directed medially. These parts are densely granulate (Fig. 53). Nine pairs of fine, short notogastral setae present.



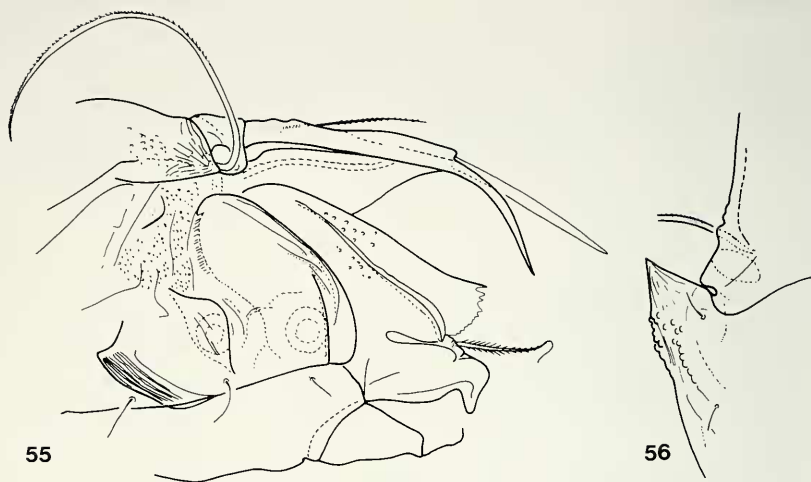
53



54

Figs 53-54

*Teraja wongi* gen. n., sp. n. - 53: body in dorsal view, 54: body in ventral view.



Figs 55-56

*Teraja wongi* gen. n., sp. n. - 55: prodorsum in lateral view, 56: pteromorpha.

**Ventral region** (Fig. 54): Pedotecta 1, 2-3 and discidium with transversal rugae, surface of the epimeres and the ventral plate smooth. Epimeral setae fine, pilose. Epimeral region divided by a strong x-shaped band only. Genital and aggenital setae pilose. Epimeral region divided by a strong x-shaped band only. Genital and aggenital sera pilose, anal and adanal setae simple and very short.

**Remarks:** The new species stands very near to *T. fimbriata* (Mahunka, 1989) comb. n.: it is distinguished by the shape of its lamellar cuspis (much shorter in *T. fimbriata*) and the number of the digitiform extensions (9-10 in *T. fimbriata*).

I dedicate the new species to Dr. K. M. Wong from the Forest Research Centre, Sungai Liang in recognition of this great assistance to the Geneva Expedition.

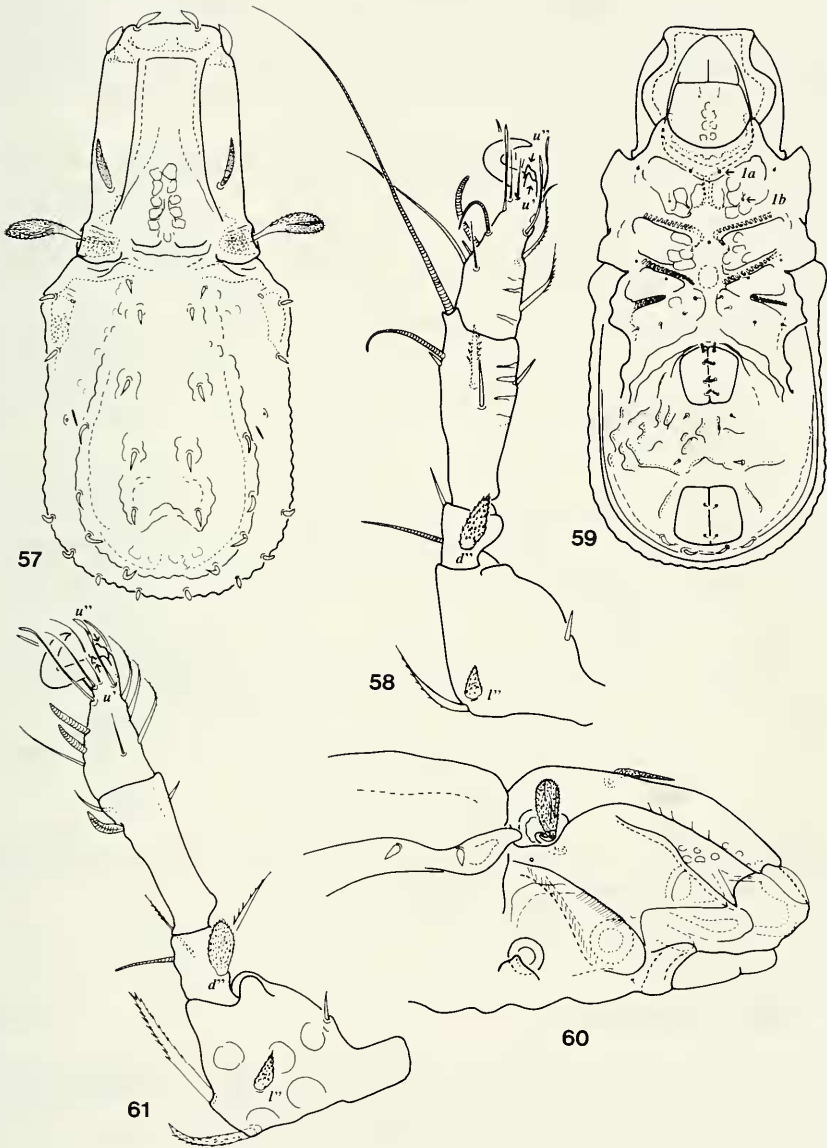
### **Hardybodes flabellatus** sp. n.

(Figs 57-61)

**Material examined:** Holotype: Bru-88/38, 3 paratypes from the same sample; 2 paratypes: Bru-88/32; 4 paratypes: Bru-88/21. Holotype and 6 paratypes: MHNG, 3 paratypes (1371-PO-89): HNHM.

**Measurements.** - Length: 266-319  $\mu\text{m}$ ; width: 123-153  $\mu\text{m}$ .

**Prodorsum:** Whole surface (as whole surface of the body) covered by a granular layer of secretions. Rostrum very wide, its anterior margin nearly straight or slightly convex medially. Rostral and lamellar setae phylliform, both pairs smooth, the latter larger than the former. Rostral setae originating very far from each other, near to the lamellar setae. Lamellae running parallel, thus prodorsum, approximately



FIGS 57-61

*Hardybodes flabellatus* sp. n. - 57: body in dorsal view, 58: leg I, 59: body in ventral view, 60: prodorsum in lateral view, 61: leg II.

rectangular in dorsal view (Fig. 57). No sharp lamellar cuspides, anterior outer margin of lamellae with some alveoli and with some weak rugae. Interlamellar region with some spots. Basal part of prodorsum with a strong transversal rib. Interlamellar setae lanceolate, originating on the lamellar surface, directed forwards, their surface spiculate. Sensillus large, spatulate (Fig. 60), directed outwards, its surface distinctly barbed.

**Notogaster:** No dorsosejugal suture observable medially. Median part well framed and protruding from notogastral surface. In this part some pairs of additional elevations present and on the posterior part some large light spots. Fifteen pairs of notogastral setae present, all dilated distinctly spiculate, similar in shape to the intelamellar setae, but all are much smaller than the latter. Two pairs of setae arising in humeral, 4 pairs in posteromarginal, position (Fig. 57).

**Coxisternal region:** Epimeral borders and apodemes perceptible, as are some irregular spots and ribs. All epimeral setae minute, but their alveoli readily observable. Epimeral setal formula: 3-1-3-3. Setae *1a* originating characteristically in front of *1b* (Fig. 59).

**Anogenital region:** Shorter in longitudinal direction than the epimeral region. Surface between the genital and anal aperture, and also lateral parts, with some wrinkles. Genital and aggenital setae slightly pilose, adanal setae dilated (similarly to the notogastral setae), anal setae minute. Setae *ad*<sub>3</sub> originating very far anteriorly from the anal aperture.

**Legs:** Femur of leg I and II areolate, seta *l''* phylliform. Seta *d''* on genu also wide, dilated, their surface distinctly spiculate. Seta *u* on all legs modified, short, no other spiniform seta on tarsi I and II (Figs 58, 61). Setal formulae:

I: 1-4-3+1-4+2-16+2-1

II: 1-4-3+1-2+1(!)-15+2-1

Femur III with thinner, femur IV with broader ventral edge, femur III dilated dorsally. Legs III and IV with no special characteristics.

**Remarks:** See the remarks after the next *Hardybodes* species.

### **Hardybodes penicillatus** sp. n.

(Figs 62-66)

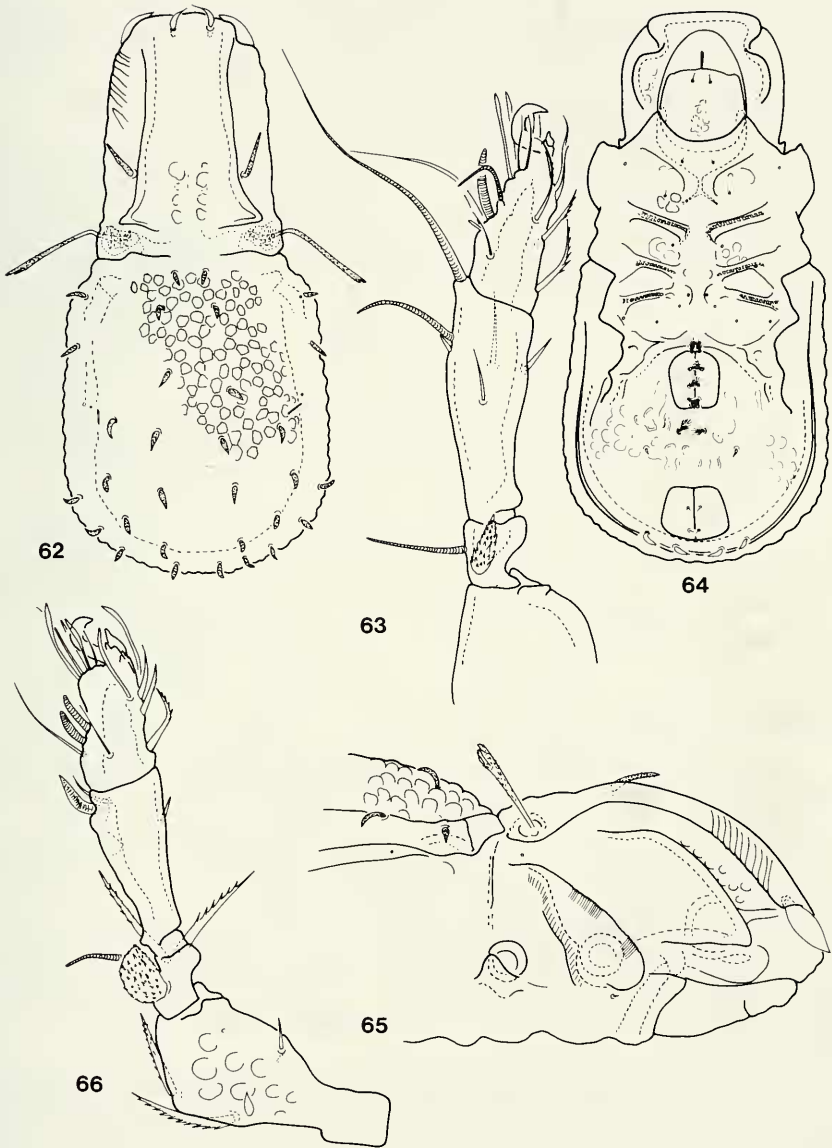
**Material examined:** Holotype: Bru-88/35, 6 paratypes from the same sample. Holotype and 3 paratypes: MHNG, 3 paratypes (1371-PO-89): HNHM.

**Measurements.** - Length: 295-379  $\mu$ m; width: 138-167  $\mu$ m.

**Prodorsum:** Rostrum wide, anterior margin approximately straight. Prodorsum oblong in dorsal view, lamellae narrow. Outer margin of lamellae distinctly rugose. Prodorsal setae similar to the preceding species, but sensillus much longer and thinner, distal end not spatulate (Fig. 65).

**Notogaster:** Ornamented by large tubercles, forming a polygonal network (Fig. 62). Fifteen pairs of notogastral setae present, similar to the preceding species.





FIGS 62-66

*Hardybodes penicillatus* sp. n. - 62: body in dorsal view, 63: leg I, 64: body in ventral view, 65: prodorsum in lateral view, 66: leg II.

**Coxisternal region** (Fig. 64): Similar to *H. flabellatus*.

**Anogenital region**: Surface between the genital and anal apertures and lateral parts with some round tubercles and short wrinkles. Genital and aggenital setae plumose, adanal setae phylliform and spiculate, anal setae minute.

**Legs**: The form and the chaetotaxy of all legs (leg. I, II: figs 63, 66) are exactly the same as those of *Hardybodes flabellatus*.

**Remarks**: These two new species were easy to place in the genus *Hardybodes* Balogh, 1970, although some corrections and additions to the generic diagnosis are necessary. Consequently, the peculiar form of the rostrum and the rostral setae is characteristic only for the type species (*H. mirabilis* Balogh, 1970). The notogaster is not always flat, in the new species its median part distinctly projects.

The three species may be separated by the following key:

- 1     Rostral part of prodorsum elongated, rostral and lamellar setae T-shaped; interlamellar region with a complex structure. . . . . *mirabilis* Balogh, 1970
- Rostral part of prodorsum normal, wide, almost straight anteriorly. . . . .
- . . . . . 2
- 2     Sensillus very wide, spatulate; notogaster without tubercles; genital setae with some short cilia. . . . . *flabellatus* sp. n.
- Sensillus long, narrow, without a spatulate head; notogaster with tubercles; genital setae plumose. . . . . *penicillatus* sp. n.

**Pasocephus eremaeozetoides** sp. n.

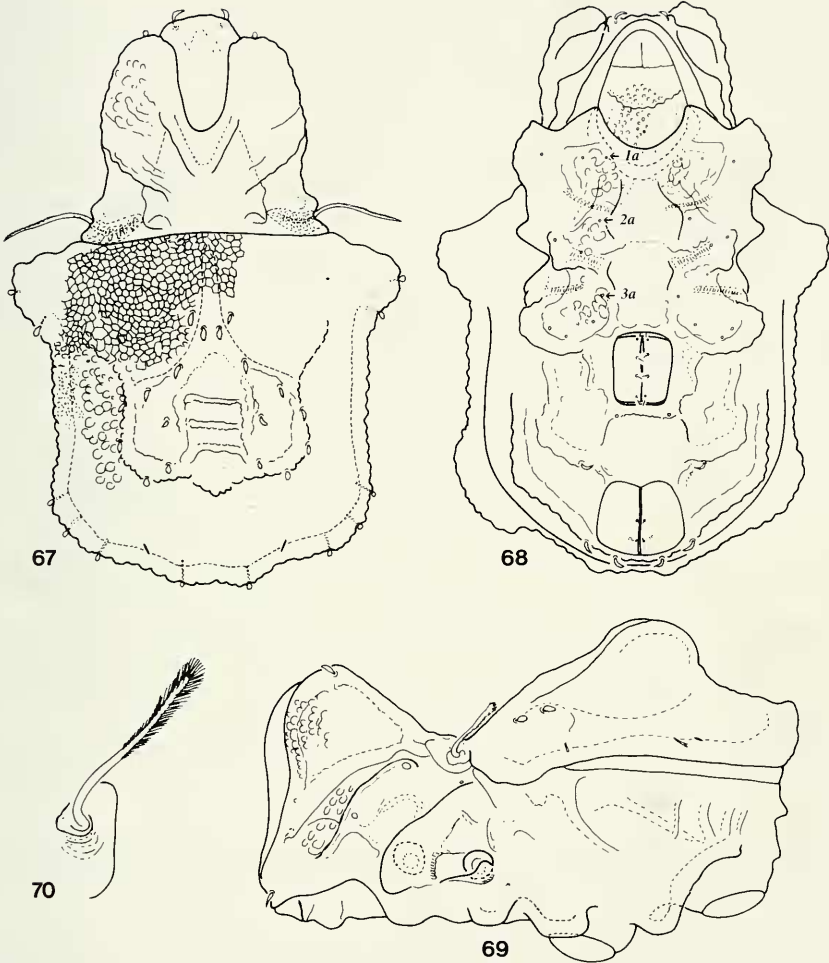
(Figs 67-73)

**Material examined**: Holotype: Bru-88/32; 3 paratypes from the same sample. Holotype and 1 paratype: MHNG, 2 paratypes (1373-PO-89): HNHM.

**Measurements**. - Length: 379-482  $\mu\text{m}$ ; width: 261-335  $\mu\text{m}$ .

**Prodorsum**: Lamellae conspicuously protruding above the prodorsal surface; their basal parts fused into a typical U-shaped formation in dorsal view (Fig. 67). Prodorsal surface coarsely wrinkled anteriorly and (in common with the rest of the prodorsal surface) finely granulate basally. Lateral part of prodorsum and surface between lamella and tutorium ornamented by some areolae. Basal part of prodorsum with two depressions. Sensillus (Fig. 70) long, distinctly ciliate, directed outwards and slightly backwards.

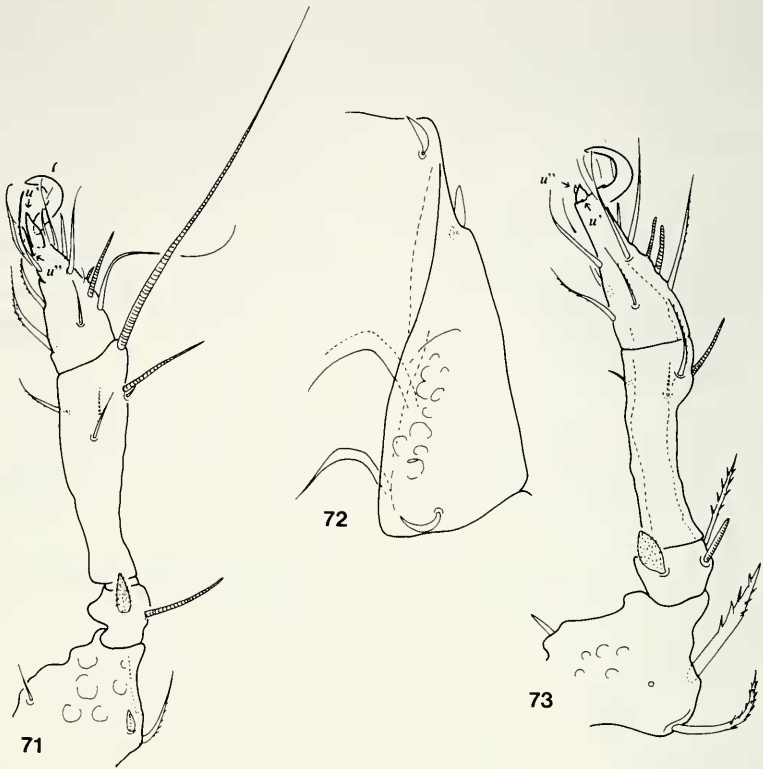
**Notogaster**: Dorsosejugal suture clearly visible. Median part of notogaster distinctly protruding (Fig. 69); this part consists of two elevations, between them there is a hollow divided by three transversal costulae, and from these elevations three gradually decreasing cristae are directed forward. Whole surface ornamented, anteriorly and anterolaterally polygonated, with symmetrically arranged tubercles around the irregularly wrinkled median elevation. Posterolateral margin granulate. Fifteen pairs of small, but slightly dilated, phylliform notogastral setae present, two pairs of them arising from the humeral apophysis, four of them in a posteromarginal position and the rest arising on the median elevation.



FIGS 67-70

*Pasocepheus ermaeozetoides* sp. n. - 67: body in dorsal view, 68: body in ventral view, 69: body in lateral view, 70: sensillus.

**Ventral region:** Mentum with a wide transverse crest, its surface coarsely foveolate. Apodemes and epimeral borders short, with a wide median hollow between the epimeral surfaces (Fig. 68). Three pairs of large tubercles present on epimeres 1 and 4 in the sejugal region, being clearly visible also in lateral view. Epimeral setal formula: 3-1-3-3, but setae 3a originating on fourth epimeres; all setae minute. The distance between the median setae (1a-1a, 2a-2a, etc.) is great, due to the



FIGS 71-73

*Pasocephus eremaeozetoides* sp. n. - 71: leg I, 72: lamella in lateral view, 73: leg II.

presence of the median hollow. Anogenital region framed by two strong, distinct crests, the inner one running around the genital aperture and continuing to the anal aperture, the other one running far laterally. Surface of the genital and anal apertures wrinkled. Anogenital setal formula: 4-1-2-3. Adanal lyrifissures were not observed. Adanal setae phylliform, all the other setae simple and minute.

**Legs:** All trochanters and femora pitted with areolae, the other segments smooth. Chaetotaxy of all legs typical for the family, setae  $u'$  on every tarsus bigger than  $u''$ . The position of the setae of legs I and II is shown in Figs 71 and 73.

**Remarks:** On the basis of the characteristic structure of the body the new species is easily classifiable into the until now monotypical genus *Pasocephus* Aoki, 1976. According to the original description this genus is characterized by 13 pairs of notogastral setae, but possibly (type specimens not seen) two pairs of setae in the anterior part of notogaster were overlooked by AOKI. The new species is readily

distinguished from the type species of *Pasocephus* (*P. triarcuratus* Aoki, 1976) by the form of its notogastral elevation (three elevations exist in *P. triarcuratus*) and by its very large humeral apophysis (absent in *P. triarcuratus*).

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